

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1. (original) In a system serially including a compressor, a discharge line, a condenser, an expansion device, an evaporator and a suction line, means for achieving capacity control comprising:

a solenoid valve in said suction line;

means for rapidly pulsing said solenoid valve whereby the rate of flow in said suction line to said compressor is modulated;

a fluid path extending from a point intermediate said condenser and said expansion device to said compressor at a location corresponding to an intermediate point of compression in said compressor;

a bypass line connected to said fluid path and said suction line;

a solenoid valve in said bypass line;

means for rapidly pulsing said solenoid valve in said bypass line whereby the rate of flow of bypass to said suction line is modulated.

Claim 2. (original) The capacity control of claim 1 further including;

an economizer circuit connected to said fluid path;

a solenoid valve in said economizer circuit; and

means for rapidly pulsing said solenoid valve in said economizer circuit whereby the rate of economizer flow to said compressor is modulated.

Claim 3. (original) In a system serially including a compressor, a discharge line, a condenser, an expansion device, an evaporator and a suction line, means for achieving capacity control comprising:

a solenoid valve in said suction line;

means for rapidly pulsing said solenoid valve whereby the rate of flow in said suction line to said compressor is modulated;

a fluid path extending from a point intermediate said condenser and said expansion device to said compressor at a location corresponding to an intermediate point of compression in said compressor;

an economizer circuit connected to said fluid path;

a solenoid valve in said economizer circuit; and

means for rapidly pulsing said solenoid valve in said economizer circuit whereby the rate of economizer flow to said compressor is modulated.

Claims 4-10. (canceled)

Claim 11. (Previously Presented) The air conditioning or refrigeration system of claim 13, wherein the capacity controller comprises a microprocessor.

Claim 12. (Previously Presented) The air conditioning or refrigeration system of claim 13, wherein the suction line valve is a solenoid valve.

Claim 13. (Currently Amended) An air conditioning or refrigeration system comprising:

an evaporator;

a compressor;

a refrigeration fluid suction line from the evaporator to the compressor, the refrigeration fluid suction line operative to carry refrigeration fluid from the evaporator to the compressor;

a capacity controller operative to generate capacity control signals for capacity modulation; and

a suction line valve, in the refrigeration fluid suction line, operatively connected to the capacity controller to receive the capacity control signals from the capacity controller, and operable to alternate between fully open and fully closed positions in

response to the capacity control signals with a cycling time shorter than the response time of the system to modulate compressor capacity;

wherein the suction line valve in the fully closed position permits a limited fluid flow through the refrigeration fluid suction line.

Claim 14. (canceled)

Claim 15. (Previously Presented) The air conditioning or refrigeration system of claim 16, wherein the capacity controller comprises a microprocessor.

Claim 16. (Currently Amended) An air conditioning or refrigeration system comprising:

an evaporator;

a compressor;

a refrigeration fluid suction line from the evaporator to the compressor, the refrigeration fluid suction line operative to carry refrigeration fluid from the evaporator to the compressor;

a capacity controller operative to generate capacity control signals for capacity modulation; and

a solenoid valve, in the refrigeration fluid suction line, operatively connected to the capacity controller to receive the capacity control signals from the capacity controller, and operable to alternate between fully open and fully closed positions in response to the capacity control signals to modulate compressor capacity;

wherein the solenoid valve in the fully closed position permits a limited fluid flow through the refrigeration fluid suction line.

Claims 17-18. (canceled)

Claim 19. (Previously Presented) The capacity modulated compressor of claim 23, wherein the suction line valve is disposed in the refrigeration fluid suction line upstream with respect to refrigerant flow to at least one refrigerant inlet port.

Claim 20. (cancelled)

Claim 21. (Previously Presented) The capacity modulated compressor of claim 23, wherein the capacity controller comprises a microprocessor.

Claim 22. (Previously Presented) The capacity modulated compressor of claim 23, wherein the suction line valve is a solenoid valve.

Claim 23. (Currently Amended) A capacity modulated compressor for an air conditioning or refrigeration system comprising:

a compressor housing comprising a compression chamber, a refrigeration fluid suction line operative to pass refrigerant to the compression chamber, and at least one refrigerant discharge line operative to pass compressed refrigerant from the compression chamber;

a capacity controller operative to generate capacity control signals corresponding to desired capacity modulation; and

a suction line valve, in the refrigeration fluid suction line, operatively connected to the capacity controller to receive the capacity control signals from the capacity controller, and operable to alternate between fully open and fully closed positions in response to the capacity control signals with a cycling time shorter than the response time of the system to modulate compressor capacity;

wherein the suction line valve in the fully closed position permits a limited fluid flow through the refrigeration fluid suction line.

Claim 24. (canceled)

Claim 25. (Previously Presented) The capacity modulated compressor of claim 28, wherein the solenoid valve is disposed in the refrigerant suction line upstream with respect to refrigerant flow to at least one refrigerant inlet port.

Claim 26. (cancelled)

Claim 27. (Previously Presented) The capacity modulated compressor of claim 28, wherein the capacity controller comprises a microprocessor.

Claim 28. (Currently Amended) A capacity modulated compressor for an air conditioning or refrigeration system comprising:

a compressor housing comprising a compression chamber, at least one refrigerant suction line operative to pass refrigerant to the compression chamber, and at least one refrigerant discharge line operative to pass compressed refrigerant from the compression chamber;

a capacity controller operative to generate capacity control signals corresponding to desired capacity modulation; and

a solenoid valve, in the refrigerant suction line, operatively connected to the capacity controller to receive the capacity control signals from the capacity controller, and operable to alternate between fully open and fully closed positions in response to the capacity control signals with a cycling time shorter than the response time of the system to modulate compressor capacity;

wherein the solenoid valve in the fully closed position permits a limited fluid flow through the refrigerant suction line.

Claims 29-38. (canceled)

Claim 39. (Currently Amended) An air conditioning or refrigeration system comprising:

an evaporator;
a compressor in fluid communication with the evaporator;
a refrigeration fluid suction line operative to pass refrigeration fluid into the
compressor;
a capacity controller operative to generate capacity control signals corresponding
to desired capacity modulation; and
a suction line valve operatively connected to the capacity controller to receive the
capacity control signals from the capacity controller, and operable to alternate between
fully open and fully closed positions in response to the capacity control signals with a
cycling time shorter than the response time of the system to modulate compressor
capacity;
wherein a limited fluid flow is permitted into the compressor through the
refrigeration fluid suction line when the suction line valve is in the fully closed position.

Claim 40. (Previously Presented) The air conditioning or refrigeration system of claim
39, wherein the capacity controller comprises a microprocessor.

Claim 41. (Previously Presented) The air conditioning or refrigeration system of claim
39, wherein the suction line valve is a solenoid valve.

Claim 42. (Previously Presented) The air conditioning or refrigeration system of claim
39, wherein the suction line valve is disposed in the refrigeration fluid suction line
upstream with respect to refrigerant flow to at least one refrigerant inlet port.

Claim 43. (Currently Amended) An air conditioning or refrigeration system comprising:
an evaporator;
a compressor;
a refrigeration fluid suction line from the evaporator to the compressor, the
refrigeration fluid suction line operative to carry refrigeration fluid from the
evaporator to the compressor;

a capacity controller operative to generate capacity control signals corresponding to desired capacity modulation; and

a suction line valve, in the refrigeration fluid suction line, operatively connected to the capacity controller to receive the capacity control signals from the capacity controller, and operable to alternate between fully open and fully closed positions in response to the capacity control signals with a cycling time shorter than the response time of the system to modulate compressor capacity;

the refrigeration fluid suction line having a first condition in which a limited fluid flow is permitted through the refrigerant flow line when the suction line valve is in the fully closed position.

Claim 44. (Previously Presented) The air conditioning or refrigeration system of claim 43, wherein the refrigeration fluid suction line has a second condition in which no fluid flow is permitted through the refrigeration fluid suction line when the suction line valve is in the fully closed position.

Claim 45. (Previously Presented) The air conditioning or refrigeration system of claim 43, wherein the capacity controller comprises a microprocessor.

Claim 46. (Previously Presented) The air conditioning or refrigeration system of claim 43, wherein the suction line valve is a solenoid valve.

Claim 47. (Previously Presented) The air conditioning or refrigeration system of claim 43, wherein the suction line valve is disposed in the refrigeration fluid suction line upstream with respect to refrigerant flow to at least one refrigerant inlet port.

Claim 48. (Currently Amended) A method of modulating the capacity of a compressor in a closed refrigerant circulating system, the compressor comprising a compression chamber in fluid communication with a refrigerant suction line of the system through which refrigerant fluid is supplied to the compression chamber, comprising:

rapidly pulsing a suction line valve, disposed in the refrigerant suction line, between a fully open position and a fully closed position to modulate compressor capacity, the refrigeration fluid suction line having a first condition in which a limited fluid flow is permitted through the refrigerant suction line when the suction line valve is in the fully closed position.

Claim 49. (Previously Presented) The method of claim 48, wherein the refrigerant suction line has a second condition in which no fluid flow is permitted through the refrigerant suction line when the suction line valve is in the fully closed position.

Claim 50. (Previously Presented) The method of claim 48, wherein pulsing the suction line valve comprises pulsing the suction line valve with a cycling time shorter than the response time of the system to modulate compressor capacity.

Claim 51. (Previously Presented) The method of claim 48, wherein the pulsing is controlled by a microprocessor.

Claim 52. (Previously Presented) The method of claim 48, wherein the suction line valve is a solenoid valve.

Claim 53. (Previously Presented) The method of claim 48, wherein the suction line valve is disposed in the refrigerant suction line upstream with respect to refrigerant flow to at least one refrigerant inlet port.